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**BIOLOGY
HIGHER LEVEL
PAPER 1**

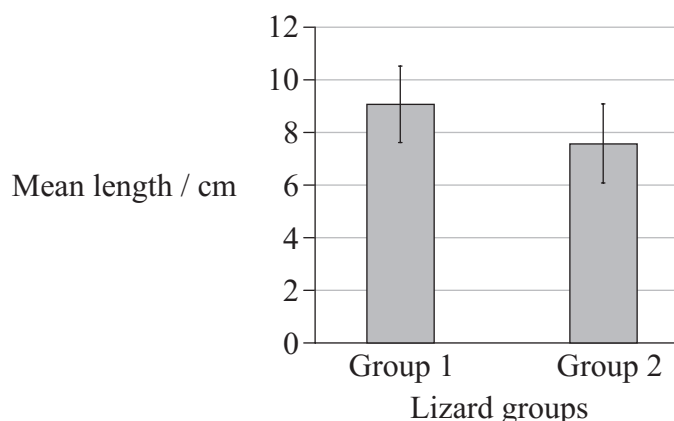
Wednesday 13 November 2013 (afternoon)

1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is *[40 marks]*.

1. The bar chart shows the mean length (in cm) of two lizard species. The error bars represent the standard deviation. What can be understood from the bar chart?



- A. Group 1 lizards are longer than all group 2 lizards.
- B. Group 2 lizards are longer than all group 1 lizards.
- C. Group 2 has same mean as group 1.
- D. Group 2 lizards can be longer than group 1 lizards.
2. What identifies the structure and function of flagella and pili?

	Flagella		Pili	
	Structure	Function	Structure	Function
A.	corkscrew shape	can pull cells together	hair like shape	used for locomotion
B.	hair like shape	can pull cells together	corkscrew shape	used for locomotion
C.	corkscrew shape	used for locomotion	hair like shape	can pull cells together
D.	hair like shape	used for locomotion	corkscrew shape	can pull cells together

3. Which property of cells is evidence for the cell theory?
- A. Cells have proteins.
- B. Cells can divide.
- C. Cells have nucleic acids.
- D. Cells can move around.

4. What identifies plant cells and animal cells?

	Plant cell	Animal cell
A.	cell wall and plasma membrane; may contain starch	no cell wall only plasma membrane; may contain glycogen
B.	no cell wall only plasma membrane; may contain starch	cell wall and plasma membrane; may contain glycogen
C.	cell wall and plasma membrane; may contain glycogen	no cell wall only plasma membrane; may contain starch
D.	no cell wall only plasma membrane; may contain glycogen	cell wall and plasma membrane; may contain starch

5. Which of the following processes take place during interphase in animal cells?

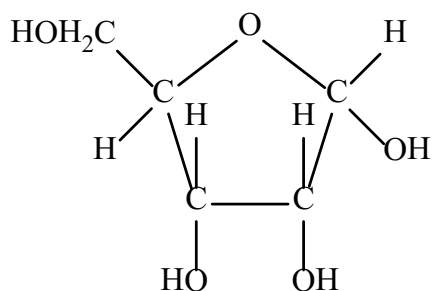
- I. Spindle formation
 - II. Transcription and translation
 - III. Increase in numbers of mitochondria
- A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

6. Which are functions of membrane proteins?

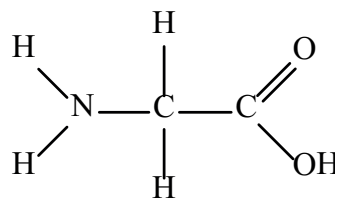
- A. Hormone binding sites and DNA replication
- B. Cell adhesion and translation
- C. Cell to cell communication and protein pumps
- D. Passive transport and glycolysis

7. Which types of molecule are shown in the diagrams?

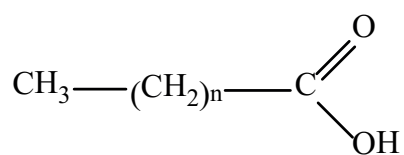
Molecule I



Molecule II

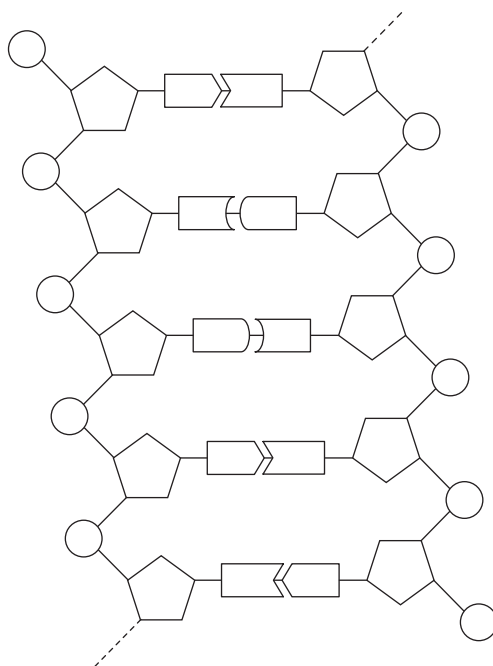


Molecule III



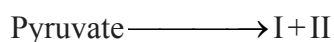
	Molecule I	Molecule II	Molecule III
A.	amino acid	fatty acid	ribose
B.	glucose	amino acid	fatty acid
C.	ribose	amino acid	fatty acid
D.	fatty acid	glucose	amino acid

8. What is correct for the DNA double helix?



	Deoxyribose bonds to a ...	Hydrogen bonds form the bond between the ...	Complementary base pairing between ...
A.	phosphate and a base	phosphates and the bases	adenine and uracil
B.	deoxyribose and a phosphate	deoxyribose molecules	thymine and guanine
C.	base and a deoxyribose	phosphate and the deoxyribose	adenine and thymine
D.	base and a phosphate	bases	cytosine and guanine

9. This reaction is a step in anaerobic cell respiration in a yeast cell.



What are the products of this reaction?

	I	II
A.	oxygen	methanol
B.	carbon dioxide	ethanol
C.	hydrogen	glucose
D.	ADP	phosphate

10. In enzyme experiments, the rate of enzyme activity often gradually decreases. What is most likely to cause this decrease?

- A. The temperature decreasing
- B. The enzyme concentration decreasing
- C. The pH decreasing
- D. The substrate concentration decreasing

11. A base substitution in a gene has changed a codon. Which of these consequences could result from a base substitution in a codon?

- I. Another amino acid will be incorporated in the protein
 - II. A stop codon is generated
 - III. The same protein will be synthesized
- A. I only
 - B. I and II only
 - C. I and III only
 - D. I, II and III

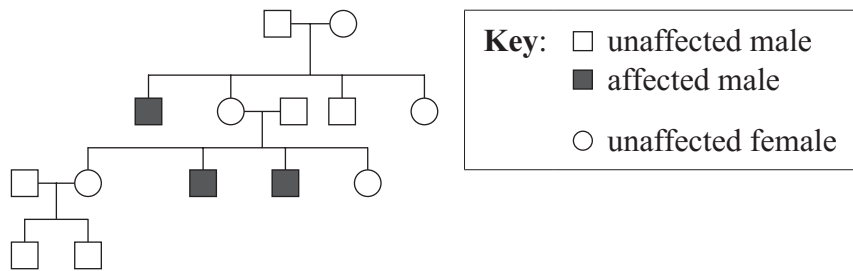
12. What is the difference between dominant, recessive and codominant alleles?

	Dominant allele	Recessive allele	Codominant allele
A.	only affecting the phenotype when in a homozygous state	always affecting the phenotype	both alleles affect the phenotype
B.	always affecting the phenotype	both alleles affect the phenotype	only affecting the phenotype when in a homozygous state
C.	always affecting the phenotype	only affecting the phenotype when in a homozygous state	both alleles affect the phenotype
D.	both alleles affect the phenotype	only affecting the phenotype when in a heterozygous state	always affecting the phenotype when in a heterozygous state

13. Which genotypes are possible when a male with blood group AB and a female with blood group O have offspring?

- A. $I^A i$ only
- B. $I^A i$ and $I^B i$
- C. $I^A i$ and ii
- D. $I^A i$, $I^B i$ and ii

14. The following shows a pedigree chart.



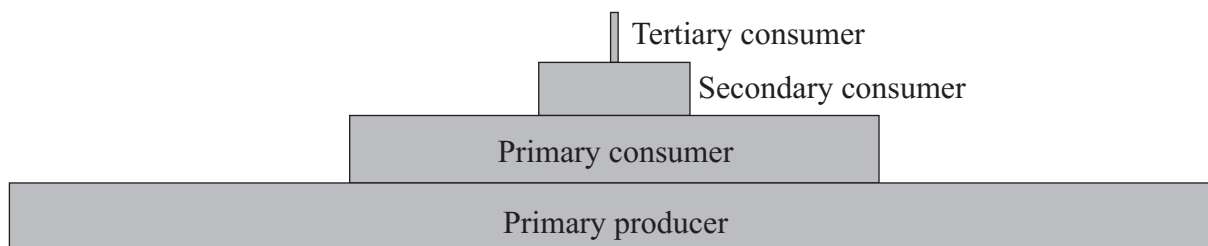
What type of inheritance is shown in this pedigree chart?

- A. X-linked recessive
- B. Y-linked dominant
- C. X-linked dominant
- D. Y-linked recessive

15. What is a population?

- A. Organisms of the same genus living in an ecosystem
- B. Organisms living together and interacting in the same habitat
- C. Organisms of a species living together in the same area
- D. Organisms that can breed together

16. The following shows an energy pyramid.



How is energy lost between the trophic levels?

- A. photosynthesis, birth of an organism and digestion
 - B. respiration, death of an organism and egestion
 - C. recycling of nutrients, death of an organism and egestion
 - D. respiration, birth of an organism and digestion
17. What are examples of greenhouse gases?
- A. Ethane and ozone
 - B. Methane and nitrogen
 - C. Methane and carbon dioxide
 - D. Ethane and oxygen
18. What is the phylum of a plant that has roots, short non-woody stems, leaves often curled up in bud and dispersal is by spores not seeds?
- A. Angiospermophyta
 - B. Bryophyta
 - C. Coniferophyta
 - D. Filicinophyta

19. What is accepted by scientists as evidence for evolution?

- I. Similarities in bone structure between the wings of a bat and the fins of a porpoise
 - II. Changes in dog breeds caused by artificial selection
 - III. Extinction of dinosaurs
- A. I only
 - B. I and II only
 - C. I and III only
 - D. I, II and III

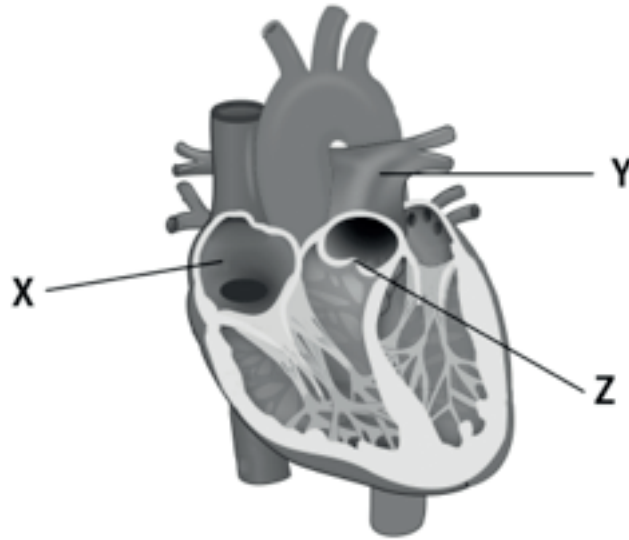
20. What are features of the enzyme amylase?

	Substrate	Source	Optimum pH
A.	starch	salivary glands	7
B.	lignin	pancreas	1.5
C.	cellulose	liver	4
D.	glycogen	kidney	9

21. Why are antibiotics effective against pathogenic bacteria?

- A. Bacteria have a high rate of mutation
- B. Bacterial cell processes are blocked
- C. Bacteria have a slow metabolism
- D. Bacteria assimilate antibiotics

22. The diagram below shows the human heart.



[Source: © International Baccalaureate Organization 2014]

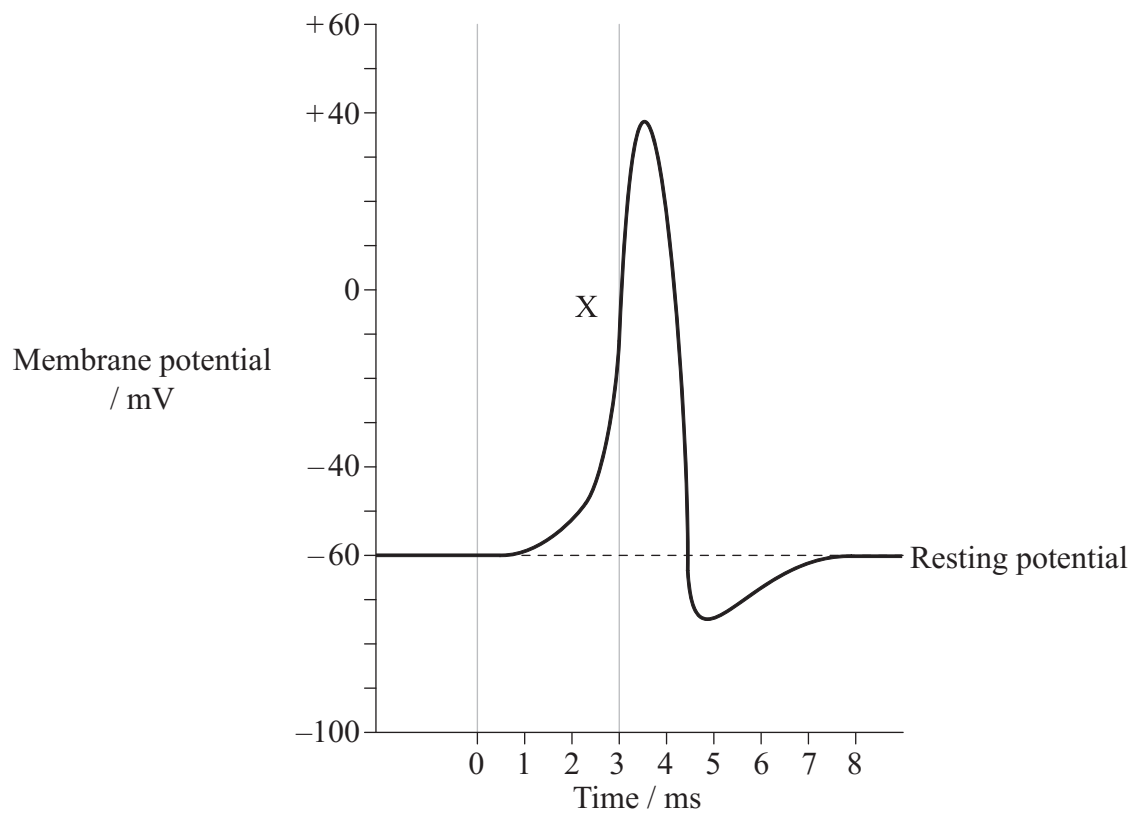
What structures are indicated by the labels X, Y and Z?

	X	Y	Z
A.	semilunar valve	pulmonary artery	right atrium
B.	right atrium	semilunar valve	pulmonary artery
C.	right atrium	pulmonary artery	semilunar valve
D.	pulmonary artery	right atrium	semilunar valve

23. What muscle actions cause air to be expelled from the lungs?

- A. Internal intercostal muscles relax and diaphragm contracts
- B. External intercostal muscles contract and abdominal wall muscles contract
- C. External intercostal muscles contract and diaphragm relaxes
- D. Internal intercostal muscles contract and abdominal wall muscles contract

24. The diagram below shows the changes in membrane potential during an action potential.



What best describes events indicated by the label X?

A.	sodium ions diffuse out of the neuron	the inside of the neuron becomes more negative
B.	potassium ions diffuse out of the neuron	the inside of the neuron becomes more negative
C.	potassium ions diffuse into the neuron	the inside of the neuron becomes more positive
D.	sodium ions diffuse into the neuron	the inside of the neuron becomes more positive

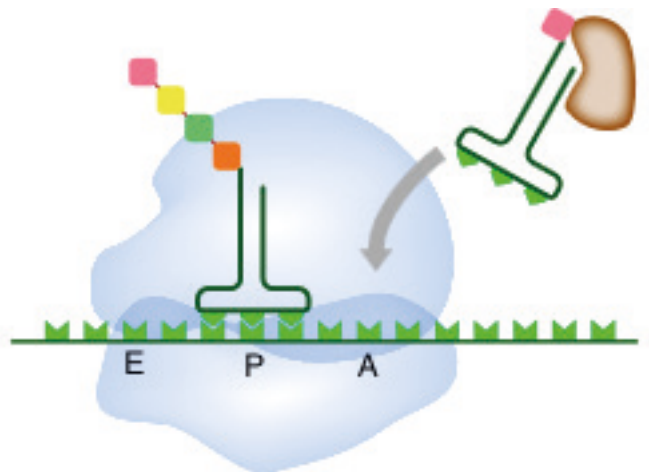
25. Where is follicle stimulating hormone (FSH) produced in females and what is its function?

- A. Produced by the ovaries and stimulates the growth of follicles
- B. Produced by the pituitary gland and stimulates the growth of endometrium
- C. Produced by the pituitary gland and stimulates the growth of follicles
- D. Produced by the follicles and stimulates the growth of endometrium

26. What are the roles of polymerases in DNA replication in prokaryotes?

	DNA polymerase I	DNA polymerase III
A.	add nucleotides in a 5' → 3' direction	remove RNA primer
B.	remove RNA primer	add nucleotides in a 5' → 3' direction
C.	remove RNA primer	add nucleotides in a 3' → 5' direction
D.	add nucleotides in a 3' → 5' direction	remove RNA primer

27. The following diagram shows a ribosome during translation.



[Source: <http://upload.wikimedia.org/wikipedia/commons/d/d1/ProteinTranslation.svg>]

What describes the specific stage of translation?

- A. Initiation
- B. Elongation
- C. Termination
- D. Translocation

28. What describes non-competitive inhibition?

- A. Inhibiting molecule does not resemble substrate and binds to an area other than active site
- B. Inhibiting molecule resembles substrate and binds to active site
- C. Inhibiting molecule does not resemble substrate and binds to active site
- D. Inhibiting molecule resembles substrate and binds to an area other than active site

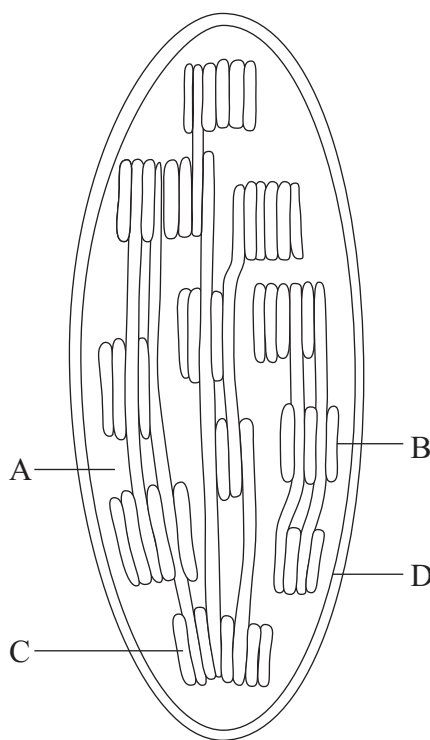
29. What makes up eukaryotic RNA immediately after transcription?

- A. Exons, introns and primers
- B. Exons and introns
- C. Introns only
- D. Exons only

30. What happens during oxidative decarboxylation of pyruvate?

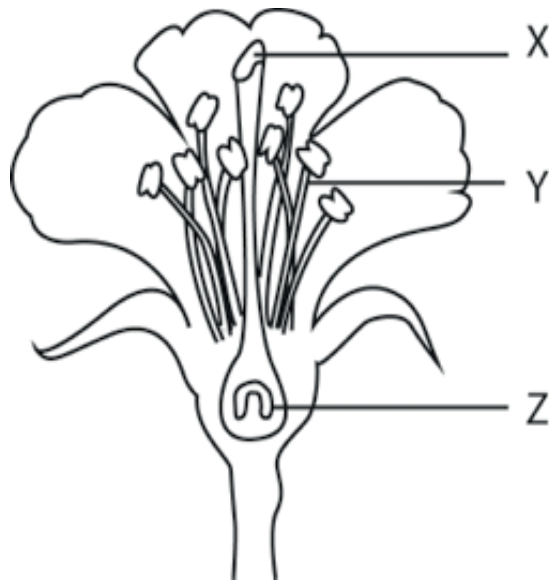
- A. Reduction of NAD^+ and oxidation of CO_2
- B. Oxidation of NADH and production of CO_2
- C. Reduction of NAD^+ and production of CO_2
- D. Oxidation of NADH and reduction of CO_2

31. Where is ATP synthase located?



[Source: © International Baccalaureate Organization 2014]

32. The following is a diagram of a flower.



[Source: © International Baccalaureate Organization 2014]

What structures are indicated by the letters X, Y and Z?

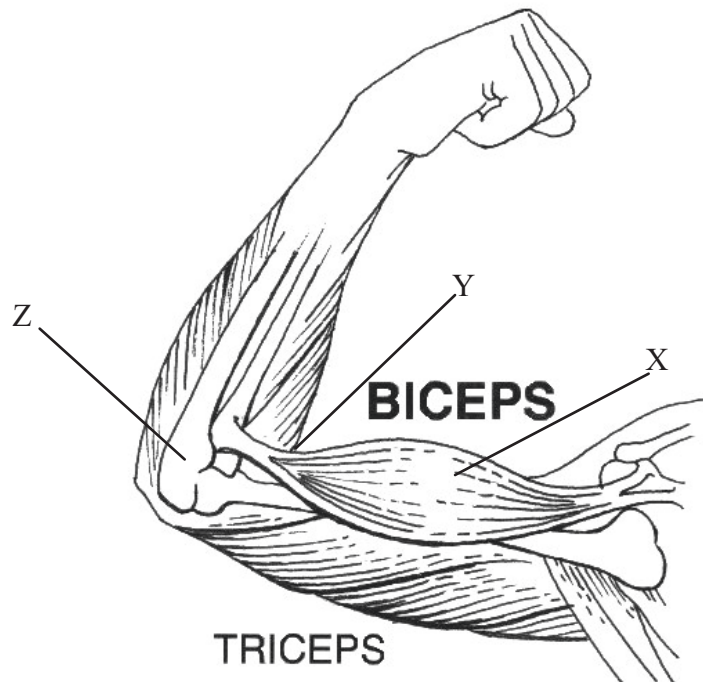
	X	Y	Z
A.	stigma	style	sepal
B.	anther	style	ovary
C.	stigma	filament	ovary
D.	anther	filament	ovary

33. What steps occur in germination after water uptake?

- A. Gibberellin is produced, followed by amylase activation
- B. Gibberellin stimulates photosynthesis to begin in the cotyledons
- C. Amylase breaks down starch to glucose which activates the embryo
- D. Amylase synthesis followed by activation of gibberellin

34. Which abiotic factors affect transpiration in plants?
- A. temperature, humidity and wind
 - B. pH, temperature and salinity
 - C. light, pH and humidity
 - D. humidity, temperature and salinity
35. In a variety of tulips, V is the allele for variegated colour and C is the allele for compound flower. Which cross will give a 1:1:1:1 ratio of phenotypes in the offspring?
- A. $VvCc \times VvCc$
 - B. $VVcc \times vvCC$
 - C. $VvCc \times vvCc$
 - D. $Vvcc \times vvCc$
36. How are B-cells activated?
- A. An antibody binds to a B-cell which is activated by a helper T-cell.
 - B. An antigen binds to a B-cell which is activated by a helper T-cell.
 - C. An unattached antigen binds to a helper T-cell which activates the B-cell.
 - D. An antibody binds to a plasma cell which is activated by a helper T-cell.

37. The following is a diagram of the elbow joint.



[Source: http://commons.wikimedia.org/wiki/File:Biceps_%28PSF%29.jpg]

What structures are indicated by the letters X, Y and Z?

	X	Y	Z
A.	triceps	tendon	radius
B.	biceps	ligament	ulna
C.	biceps	tendon	humerus
D.	triceps	ligament	humerus

38. What steps occur in blood clotting?

- A. Fibrin is converted to fibrinogen which then alters prothrombin into thrombin.
- B. Thrombin is converted to prothrombin which then alters fibrinogen into fibrin.
- C. Fibrinogen is converted to fibrin which then alters prothrombin into thrombin.
- D. Prothrombin is converted to thrombin which then alters fibrinogen into fibrin.

- 39.** What is the correct order of events in fertilization?
- A. fusion of gametes, acrosome reaction and then cortical reaction
 - B. cortical reaction, fusion of gametes and then acrosome reaction
 - C. acrosome reaction, fusion of gametes and then cortical reaction
 - D. fusion of gametes, cortical reaction and then acrosome reaction
- 40.** What is secreted after implantation of the blastocyst in the uterine wall?
- A. Estrogen which stimulates the degeneration of the corpus luteum
 - B. HCG which prevents the degeneration of the corpus luteum
 - C. Estrogen which prevents the degeneration of the corpus luteum
 - D. HCG which stimulates the degeneration of the corpus luteum
-